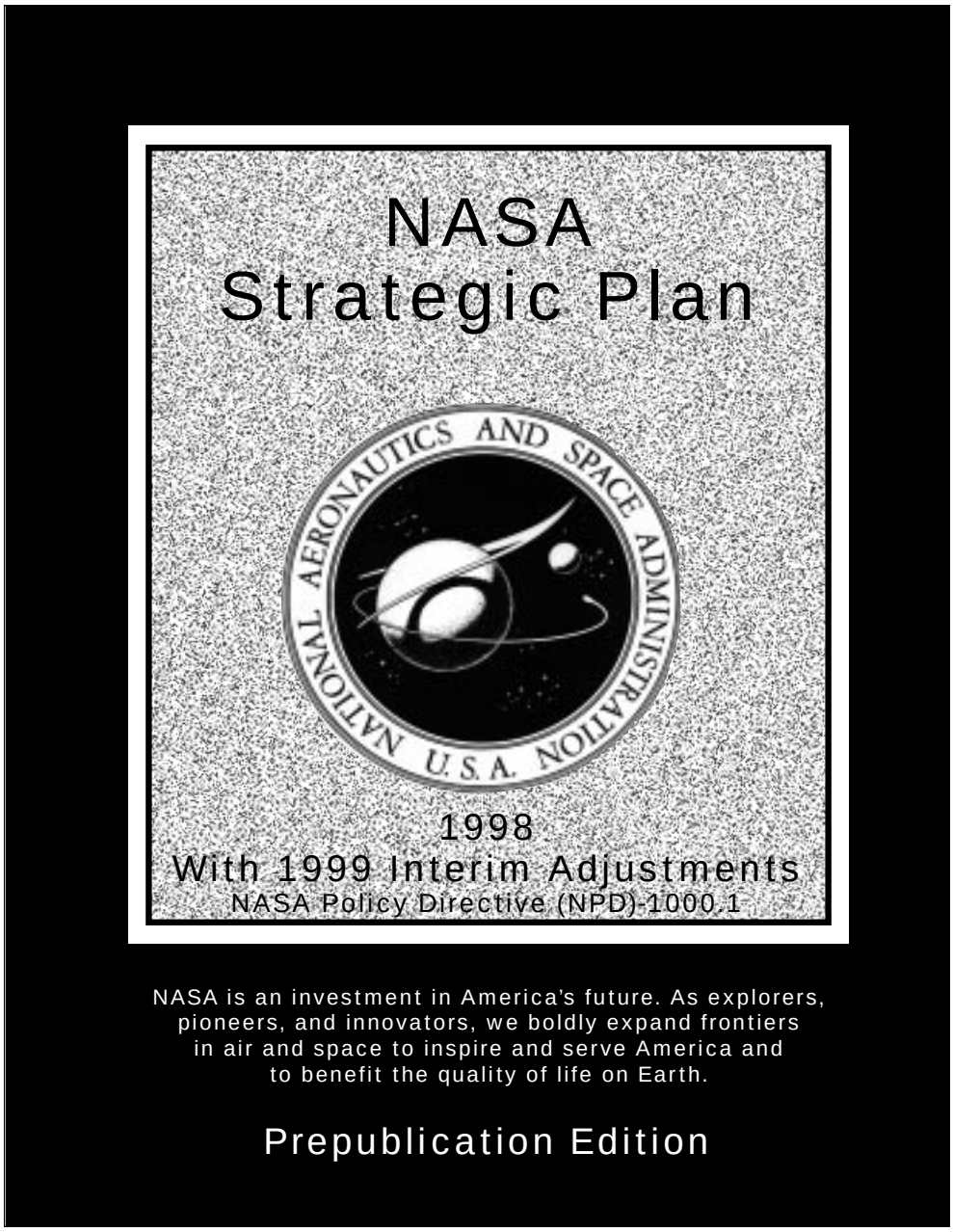

NASA
Strategic Plan
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION U.S.A.
1998
With 1999 Interim Adjustments
NASA Policy Directive (NPD)-1000.1
NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.
Prepublication Edition

Administrator's Strategic Outlook

All members of the NASA Team—our employees, contractors, academic researchers, industry, Government, and international partners—should feel a tremendous sense of pride in our many accomplishments over the past 5 years. We have looked back to the beginning of time and discovered new galaxies and planets in other solar systems. We captured the world's imagination with the remarkable achievements of the Mars Pathfinder and Hubble Space Telescope missions. We have increased our understanding of the effect of natural and human-induced activities on our home planet. Investments initiated in the past have increased the competitive posture of the aviation, space launch, and communications industries of the present. On Space Shuttle missions, we have performed experiments and technological feats that are paving the way to an era of permanent human presence in space. These achievements, and many more, are responsible for the resurgence and solidification of interest and support for NASA's activities among the Administration, Congress, and the public.

We intend to build on these accomplishments with a renewed focus on scientific research and the development and application of new cutting-edge technologies. Our unique capabilities will enable us to answer fundamental questions that have challenged humankind for centuries. Our exploration of the unknown will lead to discoveries of new worlds and generate new knowledge that stirs the soul, nourishes the mind, and enriches our lives. We will develop the tools and knowledge to help preserve our freedoms and provide hope and opportunity for future generations.

Mission success starts with safety. We will conduct our business with an enhanced fervor for safety, establishing NASA as the Nation's leader in preventing mishaps that impact the safety or health of the public, our astronauts and pilots, the NASA and contractor workforce, and the national resources under our charge. We will ensure that safety permeates everything we do at NASA. Our management team is fostering an environment that will not tolerate the occurrence of mishaps. We believe that by focusing on the safety of our missions, we will also improve quality and decrease schedule and cost. 1

In the coming years, NASA will implement programs to achieve a three-part mission encompassing Scientific Research, Space Exploration, and Technology Development and Transfer. This mission describes what we are required to do in response to policy and legislative mandates. In implementing our mission, we will pursue answers to fundamental questions of science and research

ADMINISTRATOR'S STRATEGIC OUTLOOK

1. Changes to better reflect the importance of safety

It has been recognized that technology development is not an independent business unit, but is fundamental to the successful performance of each Strategic Enterprise. Therefore, the Space Technology Enterprise has been eliminated, and technology development becomes the responsibility of the remaining four Enterprises. A new position of Chief Technologist was created to provide oversight and guidance for our technology investments. With this new structure, each Enterprise will use technology development as a means to accomplish current programs more efficiently and stimulate new programs necessary to meet our long-term goals. The goal to reduce the cost of access to space that had been associated with the Space Technology Enterprise has been added to the Aeronautics Enterprise. This expanded Enterprise was renamed Aero-Space Technology.

We have improved the level of alignment of the goals of the Agency and our Enterprise goals with the directives prescribed in two Administration policy documents. These are the National Space Policy and the Goals for a National Partnership in Aeronautics Research and Technology. We have also increased our emphasis on the need for synergy between the programs of the Enterprises and the capabilities of our partners in Government, industry, academia, and other nations. Further, we have defined the scope, goals, and objectives for four Crosscutting Processes that are critical to the success of Agency programs and activities. Finally, we have added a core value that demands safety in everything we do. 1

With the successful development of this Strategic Plan, the NASA Team must now focus on implementation. We have reached a consensus with our stakeholders, customers, and partners on our vision, mission, and roadmap to the future. We intend to implement our programs, projects, and Crosscutting Processes in a manner that enables us to deliver valuable and relevant results more effectively and efficiently. We will be relentless in our pursuit of safety and zero mishaps in all aspects of our work. 1

Each one of us—individuals who work directly on programs, as well as those who provide critical support capabilities—have an opportunity and responsibility to contribute to the development of a new NASA, the achievement of our plans, and the satisfaction of our customers. I urge all NASA employees, our stakeholders, and our customers to read this Plan and look for ways to support the accomplishment of our ambitious goals for the future.

The NASA Strategic Plan is the backbone of our new Strategic Management System. We welcome comments on the Plan and suggestions for improvement. Let me hear from you with your ideas on ways in which we can improve our ability to meet the needs of the Nation through our aeronautics and space programs.

Daniel S. Goldin
Administrator

ADMINISTRATOR'S STRATEGIC OUTLOOK

1. Changes to better reflect the importance of safety

15

The NASA Team

The goals stated in this Plan will be accomplished by a diverse group of men and women at our Headquarters, nine Centers throughout the country, and the Jet Propulsion Laboratory. We will also rely on partnerships with both large and small contractors, members of the academic community, other Federal, State, and local agencies, and other space agencies from nations around the globe.

This highly skilled team of scientists, engineers, technicians, and administrative and support professionals is dedicated to providing high-quality, technologically superior products and services in aeronautics and space. Through our dedication and professionalism, we will carry out our mission, achieve our goals and objectives, and ultimately find answers to the fundamental questions of science and research.

NASA Values

To implement this Plan, the NASA Team will strive to uphold core values related to people, excellence, and integrity.

Safety

Safety permeates everything we do at NASA, and the entire NASA workforce is committed to safety as a priority. The NASA management team is held accountable for safety. We foster an environment with zero tolerance for mishaps. We must protect the safety and health of the general public and the NASA workforce on and off the ground. By focusing on the safety of our missions, we also focus on improving quality and decreasing schedule and cost.

People

Our greatest strength is our workforce. We aggressively build a team of highly qualified individuals that is representative, at all levels, of America's diversity. We foster a culture that is built on trust, respect, teamwork, communication, creativity, and empowerment in an environment that is free of unlawful discrimination and ensures equal opportunity for all.

Excellence

We are committed to demonstrating and promoting excellence and continually improving processes, products, and services to better satisfy our customers' needs and requirements. We utilize quality-focused leadership and management, as well as scientific, engineering, and technical excellence to provide our customers with highly valued products and services in the most cost-effective, timely, and safe manner.

Integrity

We preserve America's confidence and trust by ensuring that our missions are consistent with national goals, carefully conceived, and well executed. We deliver on our promises and are accountable for our performance. We are open and honest with one another and with our customers, and we cooperate within and across organizations to deliver the highest quality results. We are bold but prudent in confronting challenges and accepting risks. We work with integrity and are dedicated to fulfilling our vision in an environment in which adherence to fundamental ethical principles and compliance with related laws and regulations flourish.

THE NASA TEAM AND VALUES

1

1. Changes to better reflect the importance of safety

Strategies and Outcomes

The Space Science Enterprise pursues the study of origins, as well as studies of the evolution and destiny of the cosmos, by establishing a continuum of exploration and science. It creates a virtual presence in the solar system, exploring new territories and investigating the solar system in all its complexity. It simultaneously probes the universe to the beginning of time, looking ever deeper with increasingly capable telescopes, scanning the entire electromagnetic spectrum from gamma rays to radio wavelengths. It also sends probes into interstellar space, beginning a virtual presence even beyond the solar system.

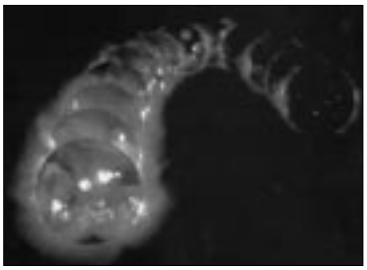
The strategy of the Enterprise is to conduct world-class research, to maximize the scientific yield from our current missions, and to develop and deploy new missions within the "faster, better, cheaper" framework of a revolutionized NASA.

Fulfilling one major commitment of previous strategic planning, the Enterprise will complete the deployment of the four "Great Observatories" with the launch of the Chandra X-ray Observatory (formerly AXAF) in 1999 and the Space Infrared Telescope Facility (SIRTF) in 2001. Complementing the discoveries of the Hubble Space Telescope and the Compton Gamma Ray Observatory launched earlier in this decade, Chandra and SIRTF are certain to add to this bounty and help unravel the mysteries of the universe.

1

Key elements of the Enterprise program will include a sustained program of robotic research, exploration, and technology development on the surface of Mars, a long-term program to obtain in situ measurements and to return samples from solar system bodies, and a progressive initiative to identify and characterize planets around other stars.

2



Changes in solar activity affect Earth in many ways. These 12 x-ray images between 1991 and 1995 demonstrate the Sun's variability.

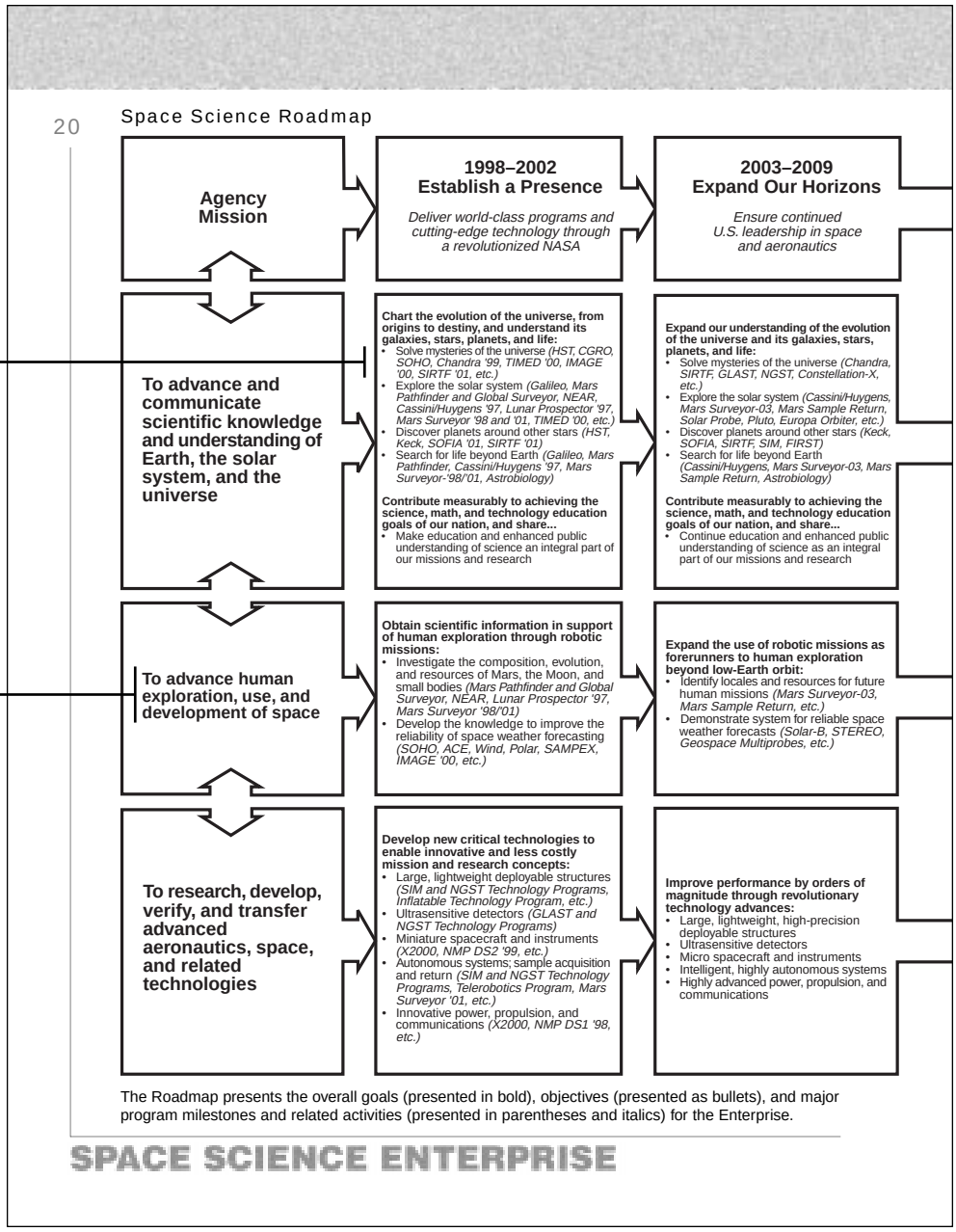
With the brilliant successes of the Mars Pathfinder, Lunar Prospector, and Transition Region and Coronal Explorer (TRACE), these Discovery and Explorer missions have visibly demonstrated that the Enterprise's "faster, better, cheaper" programs can achieve exciting results and yield superb science. The Enterprise will develop and use innovative technologies and more capable spacecraft to improve performance and lower costs of future science missions. Through programs such as Discovery and Explorer, the Enterprise will accept prudent risk, shorten development time, explore new conceptual approaches, streamline management, and make other changes to enhance efficiency and effectiveness.

3

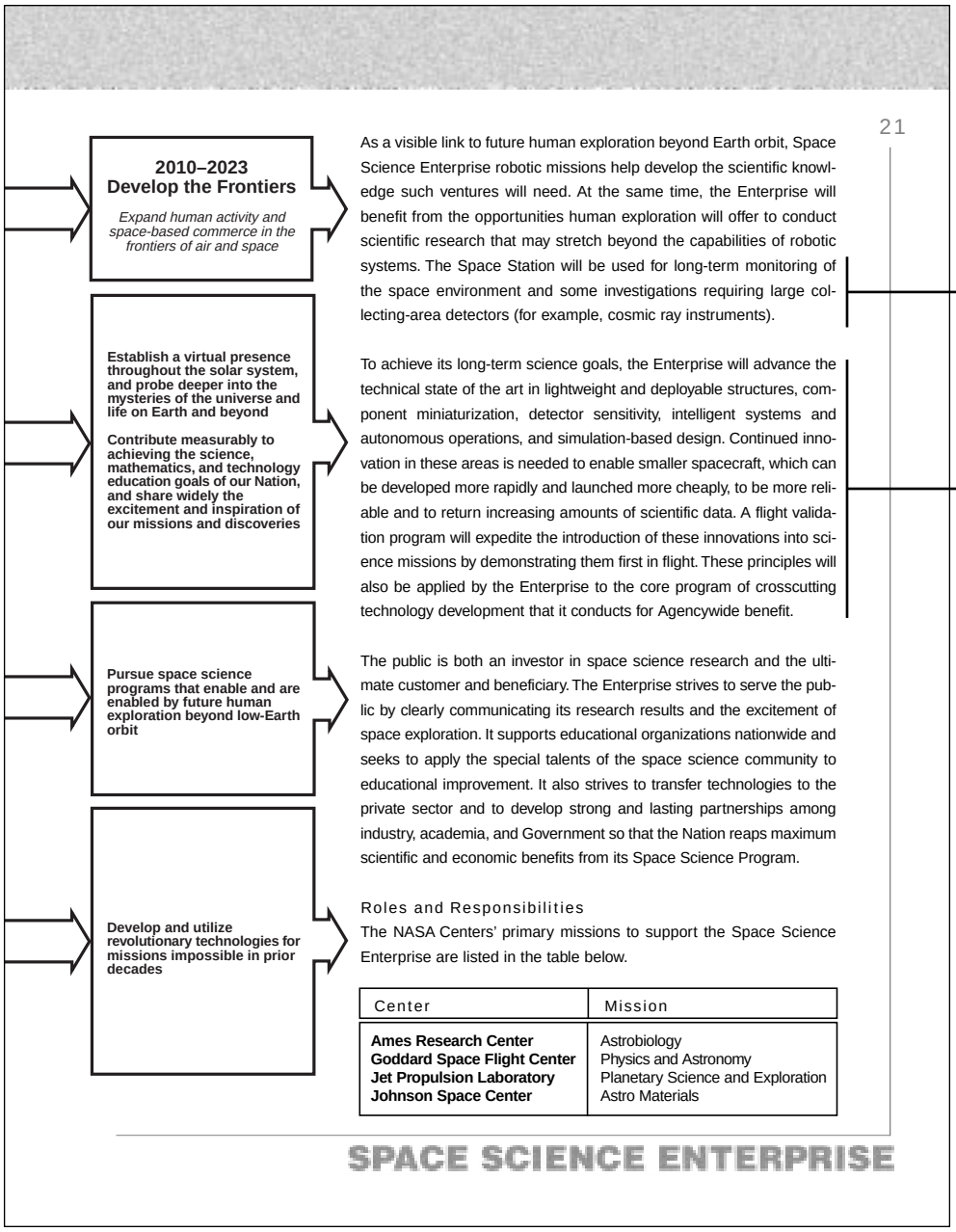
A key aspect of our strategic planning is to ensure the Enterprise acquires the advice of the external science community, and in particular the National Academy of Sciences. In addition, there is extensive collaboration with this community, international partners, and other Federal agencies, such as the National Science Foundation, Department of Defense, and Department of Energy, in the conduct of our missions and research. This collaboration is discussed more fully on page 35 of this Plan.

SPACE SCIENCE ENTERPRISE

1. Name change
2. Adds explicit reference to the National Space Policy
3. Adds discussion of technology development



1. Name change (Chandra)
2. Improved wording



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2010–2023
Develop the Frontiers

Expand human activity and space-based commerce in the frontiers of air and space

Establish a virtual presence throughout the solar system, and probe deeper into the mysteries of the universe and life on Earth and beyond

Contribute measurably to achieving the science, mathematics, and technology education goals of our Nation, and share widely the excitement and inspiration of our missions and discoveries

Pursue space science programs that enable and are enabled by future human exploration beyond low-Earth orbit

Develop and utilize revolutionary technologies for missions impossible in prior decades

As a visible link to future human exploration beyond Earth orbit, Space Science Enterprise robotic missions help develop the scientific knowledge such ventures will need. At the same time, the Enterprise will benefit from the opportunities human exploration will offer to conduct scientific research that may stretch beyond the capabilities of robotic systems. The Space Station will be used for long-term monitoring of the space environment and some investigations requiring large collecting-area detectors (for example, cosmic ray instruments). 1

To achieve its long-term science goals, the Enterprise will advance the technical state of the art in lightweight and deployable structures, component miniaturization, detector sensitivity, intelligent systems and autonomous operations, and simulation-based design. Continued innovation in these areas is needed to enable smaller spacecraft, which can be developed more rapidly and launched more cheaply, to be more reliable and to return increasing amounts of scientific data. A flight validation program will expedite the introduction of these innovations into science missions by demonstrating them first in flight. These principles will also be applied by the Enterprise to the core program of crosscutting technology development that it conducts for Agencywide benefit. 2

The public is both an investor in space science research and the ultimate customer and beneficiary. The Enterprise strives to serve the public by clearly communicating its research results and the excitement of space exploration. It supports educational organizations nationwide and seeks to apply the special talents of the space science community to educational improvement. It also strives to transfer technologies to the private sector and to develop strong and lasting partnerships among industry, academia, and Government so that the Nation reaps maximum scientific and economic benefits from its Space Science Program.

Roles and Responsibilities

The NASA Centers' primary missions to support the Space Science Enterprise are listed in the table below.

Center	Mission
Ames Research Center	Astrobiology
Goddard Space Flight Center	Physics and Astronomy
Jet Propulsion Laboratory	Planetary Science and Exploration
Johnson Space Center	Astro Materials

SPACE SCIENCE ENTERPRISE

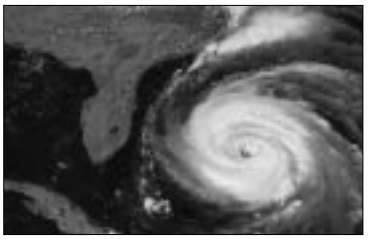
1. Adds Space Station reference
2. Adds discussion of technology development

assessments of the environment; fosters commercial use of remote-sensing data and leverages the resources of the commercial remote-sensing industry to lower the cost of acquiring data; and strengthens Earth science education and public awareness.

These goals, and the strategies that follow, implement the President's National Space Policy of September 1996. This Policy requires NASA to undertake "a program of long-term observation, research, and analysis of the Earth's land, oceans, atmosphere and their interactions, including continual measurements from the Earth Observing System. . . . In carrying out these activities, NASA will develop new and innovative space technologies and smaller more capable spacecraft to improve the performance and lower the cost of future space missions."

Through 2002, the Enterprise will deploy the first series of Earth Observing System (EOS) missions, including Landsat 7. These will join our currently operating spacecraft, such as the Tropical Rainfall Measuring Mission (TRMM). This period will also see the first launches of Earth System Science Pathfinder small satellite missions for new scientific investigations. In tandem, a strong program of aircraft and other field campaigns will validate and supplement spacecraft measurements. Modeling and assessment activities will turn the data collected into widely useful information products for research and applications. These programs are detailed in the Earth Science Strategic Enterprise Plan and supporting strategy documents.

The Enterprise is responsible for technology development needed for the next generation of Earth remote-sensing systems and is defining a science-driven strategy to guide technology investment choices. Participation in the New Millennium program is one example of the Enterprise's technology



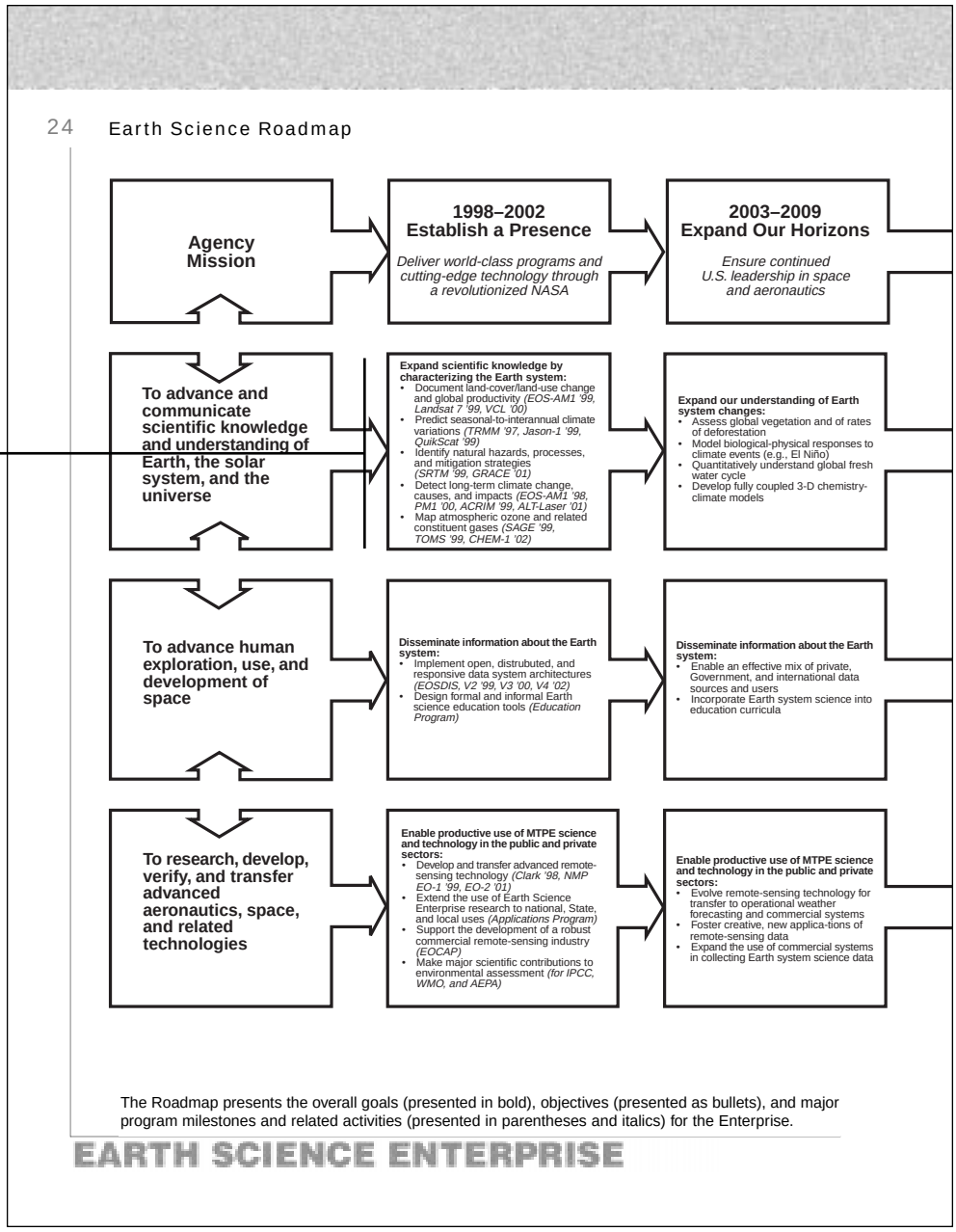
This image of Hurricane Fran was taken from the NOAA/National Weather Service's GOES-8 (Geostationary Operational Environmental Satellite) on September 4, 1996, at 1:15 p.m. EDT, less than 7 hours before the eye went ashore at Cape Fear, North Carolina. The image was enhanced and rendered at NASA's Goddard Space Flight Center, Laboratory for Atmosphere, Greenbelt, Maryland.

investment approach. In the near term, technology investments will be driven by the need for smaller, less expensive instruments to continue the EOS first series measurements and to enable key new measurement capabilities such as Light Intersection Direction and Ranging (LIDAR) for atmospheric winds. Highly distributed, advanced Internet capabilities must be developed to enable the widespread application of environmental data. In the midterm, new measurement and modeling capabilities will be pursued to enable the three-dimensional characterization of Earth's atmosphere

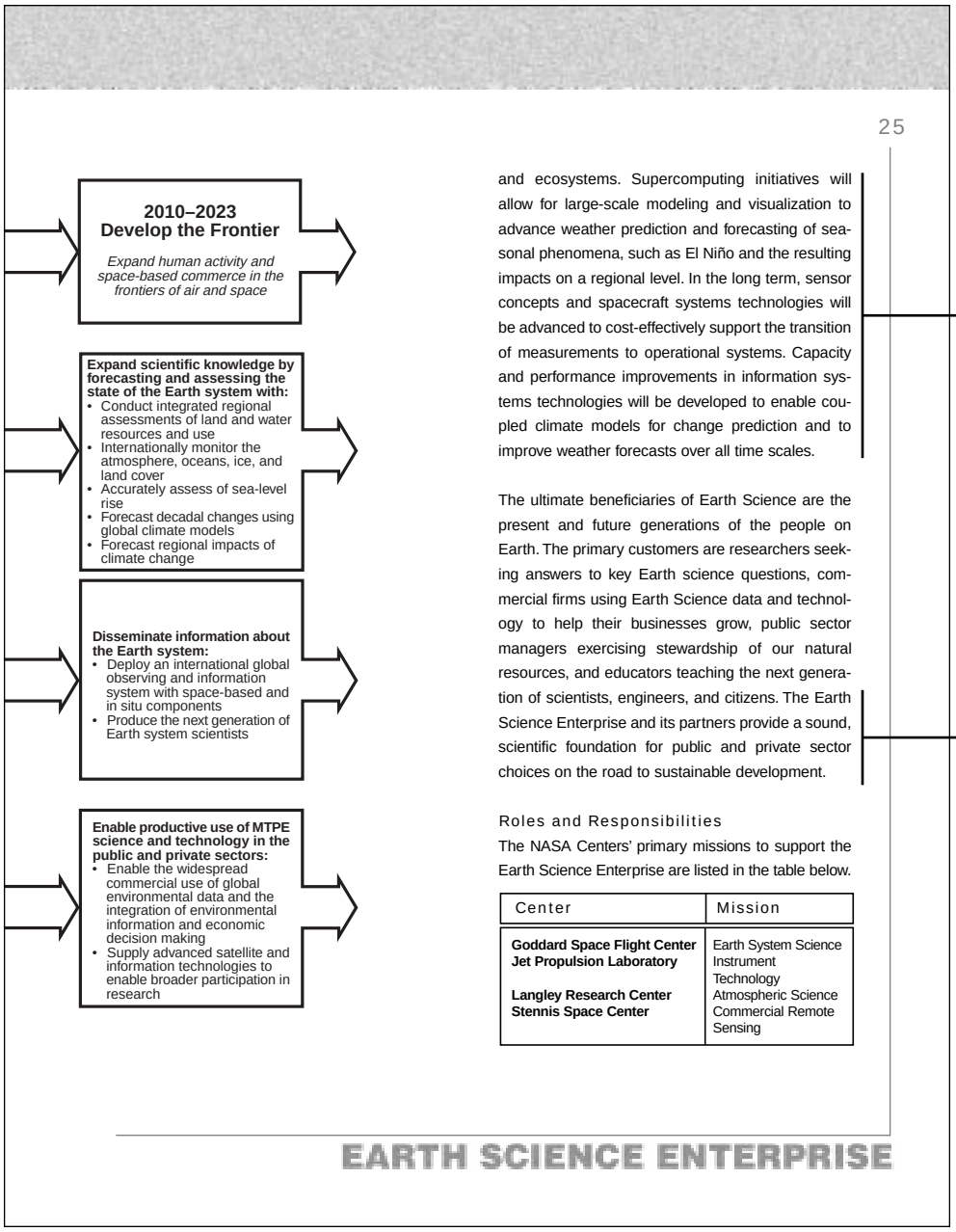
NASA's ER-2 is the country's premier high-altitude civilian research aircraft. Flying in the lower stratosphere, it allows scientists to make in situ measurements for the study of atmospheric chemistry, such as ozone breakdown. It also serves as a testbed for instruments planned for future Earth-orbiting spacecraft.

EARTH SCIENCE ENTERPRISE

1. Adds explicit reference to the National Space Policy
2. Adds discussion of technology development
3. Name change



1. Name and schedule changes



25

2010–2023
Develop the Frontier

Expand human activity and space-based commerce in the frontiers of air and space

Expand scientific knowledge by forecasting and assessing the state of the Earth system with:
- Conduct integrated regional assessments of land and water resources and use
- Internationally monitor the atmosphere, oceans, ice, and land cover
- Accurately assess of sea-level rise
- Forecast decadal changes using global climate models
- Forecast regional impacts of climate change

Disseminate information about the Earth system:
- Deploy an international global observing and information system with space-based and in situ components
- Produce the next generation of Earth system scientists

Enable productive use of MTPE science and technology in the public and private sectors:
- Enable the widespread commercial use of global environmental data and the integration of environmental information and economic decision making
- Supply advanced satellite and information technologies to enable broader participation in research

and ecosystems. Supercomputing initiatives will allow for large-scale modeling and visualization to advance weather prediction and forecasting of seasonal phenomena, such as El Niño and the resulting impacts on a regional level. In the long term, sensor concepts and spacecraft systems technologies will be advanced to cost-effectively support the transition of measurements to operational systems. Capacity and performance improvements in information systems technologies will be developed to enable coupled climate models for change prediction and to improve weather forecasts over all time scales. 1

The ultimate beneficiaries of Earth Science are the present and future generations of the people on Earth. The primary customers are researchers seeking answers to key Earth science questions, commercial firms using Earth Science data and technology to help their businesses grow, public sector managers exercising stewardship of our natural resources, and educators teaching the next generation of scientists, engineers, and citizens. The Earth Science Enterprise and its partners provide a sound, scientific foundation for public and private sector choices on the road to sustainable development. 2

Roles and Responsibilities

The NASA Centers' primary missions to support the Earth Science Enterprise are listed in the table below.

Center	Mission
Goddard Space Flight Center **Jet Propulsion Laboratory** **Langley Research Center** **Stennis Space Center**	Earth System Science Instrument Technology Atmospheric Science Commercial Remote Sensing

EARTH SCIENCE ENTERPRISE

1. Continuation of technology development discussion
2. Adds reference to partners

26

Human Exploration and Development of Space Enterprise

Mission

We seek to bring the frontier of space fully within the sphere of human activity to build a better future for all humankind. Imagine new products based on space research, such as high-quality protein crystals to allow the design of new drugs for treating disease. Envision school children learning their lessons by telepresence instruction from the Moon. Imagine commerce flourishing in space, with solar power satellites, or a Martian powerplant to permit a permanent colony. These images are part of the Human Exploration and Development of Space (HEDS) Enterprise. The mission of the Enterprise is to open the space frontier by exploring, using, and enabling the development of space and to expand the human experience into the far reaches of space.

In exploring space, HEDS brings people and machines together to overcome challenges of distance, time, and environment. Robotic science missions survey and characterize other bodies as precursors to eventual human missions. The Space Shuttle and International Space Station (ISS) serve as research platforms to pave the way for sustained human presence in space through critical research on human adaptation. These programs also provide opportunities for research with applications on Earth. HEDS serves as a catalyst for commercial space development. We will employ breakthrough technologies to revolutionize human space flight.

Phase I of the International Space Station includes nine docking missions by the Space Shuttle to the Russian Mir *space station.*

Questions to Address

HEDS pursues the answers to myriad research and engineering questions that must be answered as we learn to live and work in space. HEDS plays an important role in pursuing answers to the questions: What is the fundamental role of gravity and cosmic radiation in vital biological, physical, and chemical systems in space, on other planetary bodies, and on Earth, and how do we apply this fundamental knowledge to the establishment of permanent human presence in space to improve life on Earth? HEDS also plays an important role working with the other Enterprises to pursue answers to other fundamental questions, including: Does life exist elsewhere than on our planet?

Goals

The goals of the HEDS Enterprise are as follows:

- Expand the space frontier;
- Expand scientific knowledge;
- Enable and establish a permanent and productive human presence in Earth orbit;
- Expand the commercial development of space; and
- Share the experience and discovery of human space flight.

1

Strategies and Outcomes

The programs of NASA's HEDS respond to the goals of the National Space Policy. Under the direction of the policy, HEDS focuses its research and developments in "space science to enhance knowledge of . . . fundamental natural and physical sciences; . . . [and] human space flight to conduct scientific, commercial, and exploration activities. . . ."

2

HUMAN EXPLORATION AND DEVELOPMENT OF SPACE ENTERPRISE

1. Restructured goals
2. Adds explicit reference to the National Space Policy

The Enterprise will contribute new scientific knowledge by studying the effects of gravity and the space environment on important biological, chemical, and physical processes. This knowledge will provide fundamental insights for new Earth-bound applications and technology. We will continue to develop biomedical knowledge and technology to allow people to thrive physically and psychologically while exploring and opening the space frontier.

The Enterprise relies on the robotic missions of the Space Science Enterprise to provide extensive knowledge of the geology, environment, and resources of planetary bodies. The Space Science Enterprise missions will also demonstrate the feasibility of utilizing local resources to "live off the land."

Pursuant to the National Space Policy, HEDS will develop and operate the ISS to support activities requiring the unique attributes of humans in space and establish a permanent human presence in Earth orbit. The ISS will support future decisions on the feasibility and desirability of conducting further human exploration activities. The ISS will be the largest multinational science and engineering program in history and will vastly expand the human experience of living and working in space. This long-duration laboratory will provide unprecedented opportunities for science, technology, engineering, and commercial investigations in the space environment.

HEDS will seek out synergies between commercial capabilities and Government needs. HEDS will also join with the private sector to stimulate opportunities for commercial development in space as a key to future settlement. Near-term efforts will emphasize joint pilot projects that provide clear benefit to Earth from the development of near-Earth space, while the long-term emphasis will be on the use of resources and environments of planetary bodies for the benefit of humankind and to sustain a human presence beyond Earth.

Artist's concept of a potential Mars mission. Here, the crew has connected two habitats together to conduct a variety of surface exploration activities.

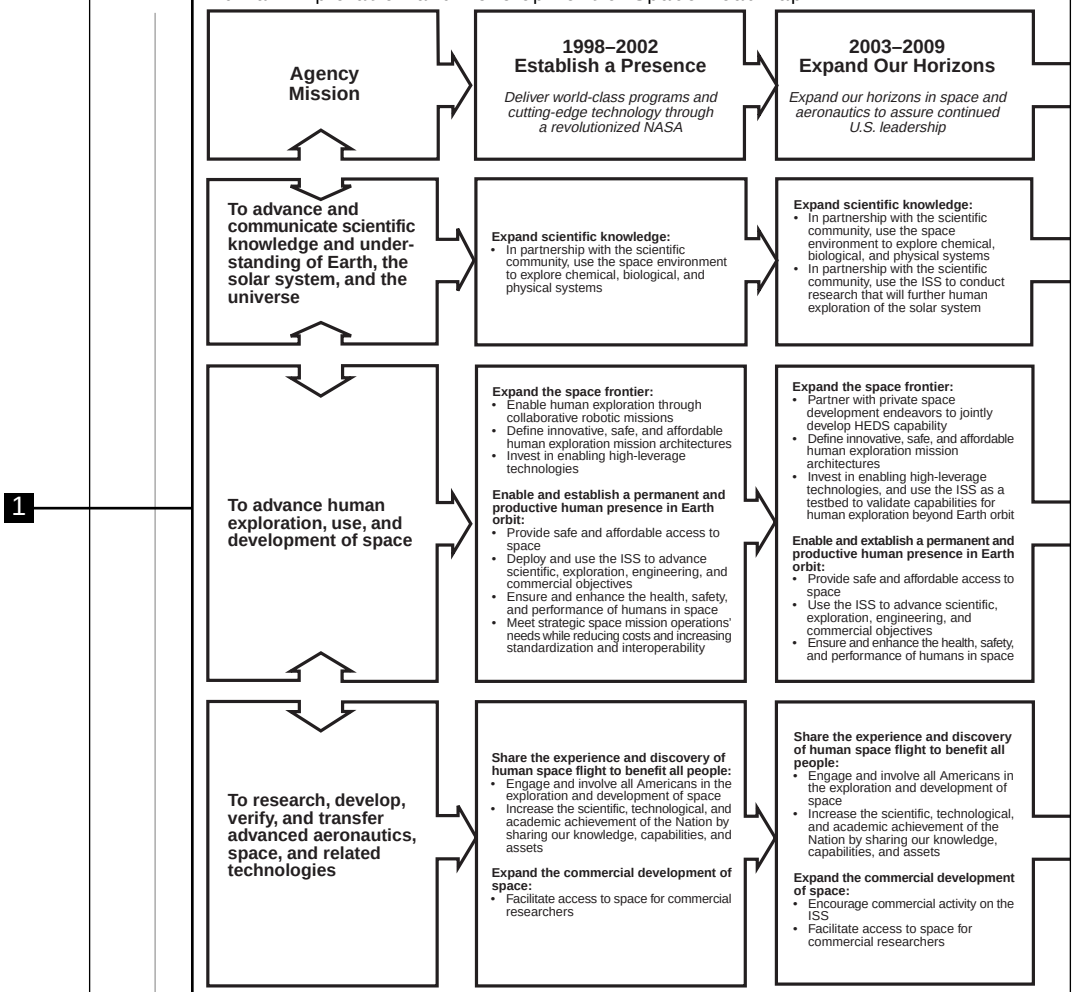
Safe, reliable, low-cost transportation is critical to the goals of the HEDS Enterprise. The National Space Policy directs the Agency to ensure safety on all space flight missions involving the Space Shuttle and the ISS. The Space Shuttle program is committed to flying safely, meeting the manifest, improving system supportability and reliability, and reducing cost—in that order of priority. HEDS will provide space operations management and communications services through commercial means while setting the stage for future investments that will be required as we explore the solar system and beyond. Per the National Space Policy, HEDS will seek to privatize or commercialize NASA's space communications operations no later than 2005.

HEDS will pursue technology development in support of its near-, mid-, and long-term objectives. In the near term, HEDS will develop state-of-the-art research facilities for the ISS while infusing technologies to improve ISS performance. Technologies in development include microelectronic sensors for monitoring the ISS atmosphere at reduced requirements for power and crew time, biological water processing to reduce resupply requirements, advanced carbon dioxide removal systems that use specially designed, regenerable chemicals, and other

HUMAN EXPLORATION AND DEVELOPMENT OF SPACE ENTERPRISE

1. Adds explicit reference to the National Space Policy
2. Adds new emphasis on commercial synergies
3. Changes better reflect the importance of safety
4. Adds discussion of technology development

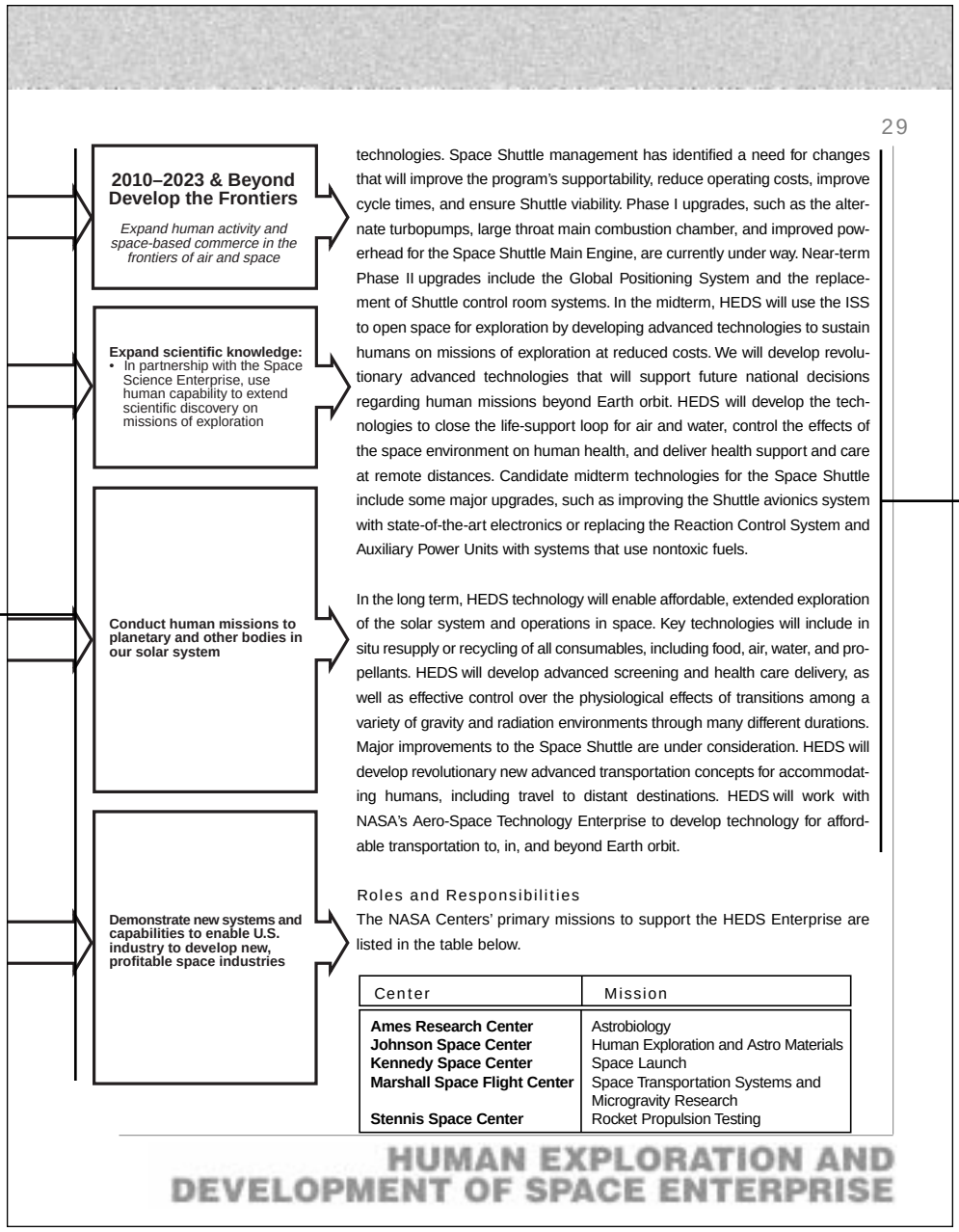
28 Human Exploration and Development of Space Roadmap



The Roadmap presents the overall goals (presented in bold), objectives (presented as bullets), and major program milestones and related activities (presented in parentheses and italics) for the Enterprise.

HUMAN EXPLORATION AND DEVELOPMENT OF SPACE ENTERPRISE

1. Changes made to reflect the splitting of the fourth HEDS goal into two separate goals, to improve clarity and, in some cases, to remove a level of detail that is more properly addressed in the Performance Plan



1. Continuation of chart with noted changes from page 95
2. Continuation of technology development discussion from page 94

1

30 Aero-Space Technology Enterprise

Mission

Research and technology play a vital role in ensuring the safety, environmental compatibility, and productivity of the air transportation system and in enhancing the economic health and national security of the Nation. However, numerous factors, including growth in air traffic, increasingly demanding international environmental standards, an aging aircraft fleet, aggressive foreign competition, and launch costs that impede affordable access and utilization of space, represent formidable challenges to the Nation.

The mission of this Enterprise is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aeronautics and space transportation technologies. Through its research and technology accomplishments, it promotes economic growth and national security through a safe, efficient national aviation system and affordable, reliable space transportation. The plans and goals of this Enterprise directly support national policy in both aeronautics and space, documented in "Goals for a National Partnership in Aeronautics Research and Technology" and "National Space Transportation Policy." This Enterprise works in alliance with its aeronautics and space transportation customers, including U.S. industry, the university community, the Department of Defense (DoD), the Federal Aviation Administration (FAA), and the other NASA Enterprises, to ensure that national investments in aero-space technology are effectively defined and coordinated and that NASA's technology products and services add value, are timely, and have been developed to the level at which the customer can confidently make decisions regarding the application of those technologies.

The Enterprise also has Agency responsibility for technology transfer and commercialization. This function is provided as an Agency-wide service to ensure wide, rapid transfer of NASA-developed technologies to U.S. industry for the social and economic benefit of all U.S. citizens.

Questions to Address

The Aero-Space Technology Enterprise is responsible for answering the question: How do we enable revolutionary technological advances that provide air and space travel for anyone, anytime, anywhere more safely, more affordably, and with less impact on the environment and improve business opportunities and global security?

Goals

The Enterprise has three major technology goals supported by ten enabling technology objectives (detailed in the Enterprise Roadmap) and a service goal.

Technology Goals

Global Civil Aviation—Develop an environmentally friendly global air transportation system for the next century of unquestioned safety that improves the Nation's mobility.

Revolutionary Technology Leaps—Revolutionize air travel and the way in which air and space vehicles are designed, built, and operated.

Space Transportation—Achieve the full potential of space for all human endeavor through affordable space transportation.

2

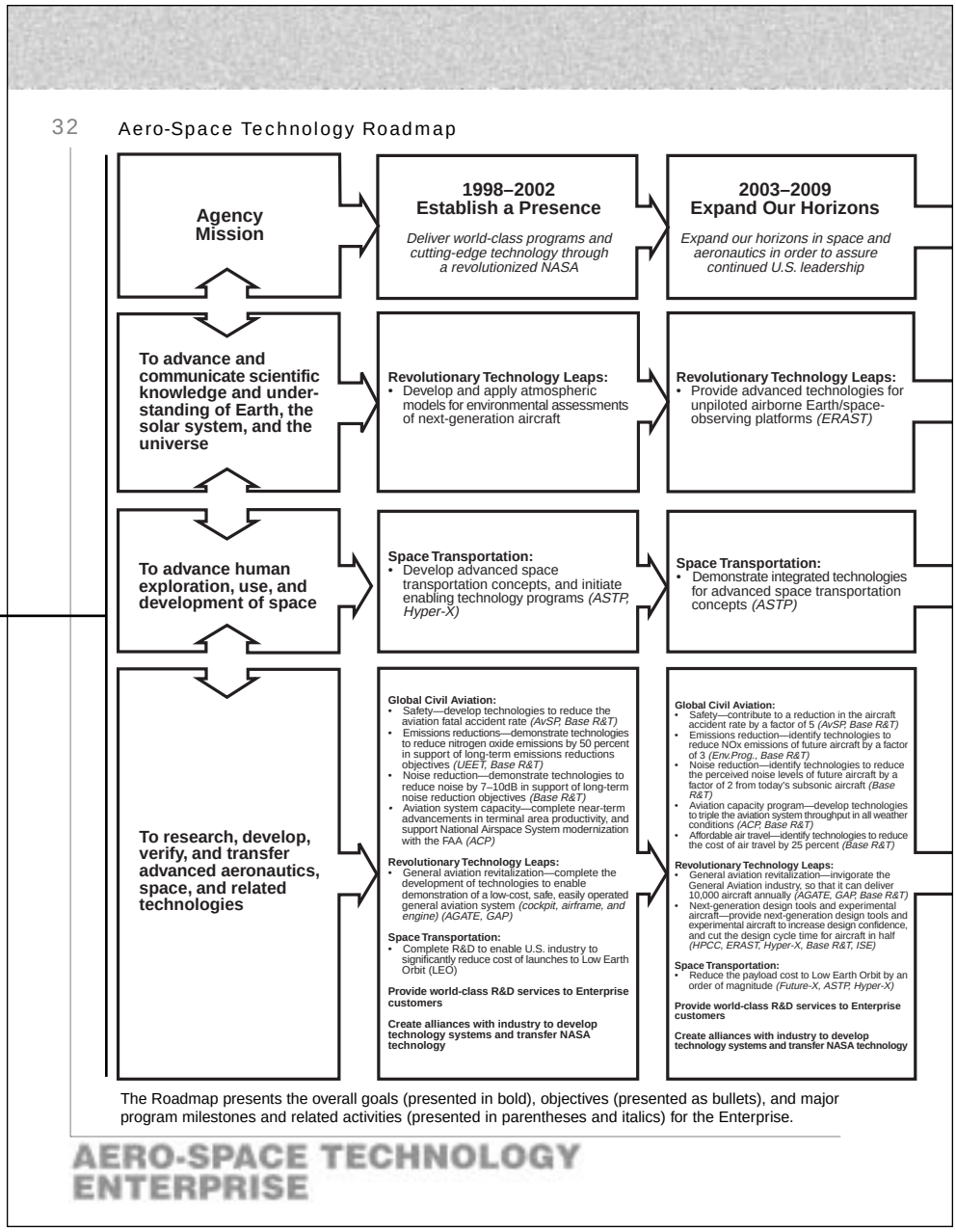
Service Goal

Research and Development (R&D) Services—Enable, and as appropriate provide, on a national basis, world-class aerospace R&D services, including facilities and expertise.

Alliances—Create alliances with industry to develop technology systems and transfer NASA technology.

AERO-SPACE TECHNOLOGY ENTERPRISE

1. Name change
2. Improved wording



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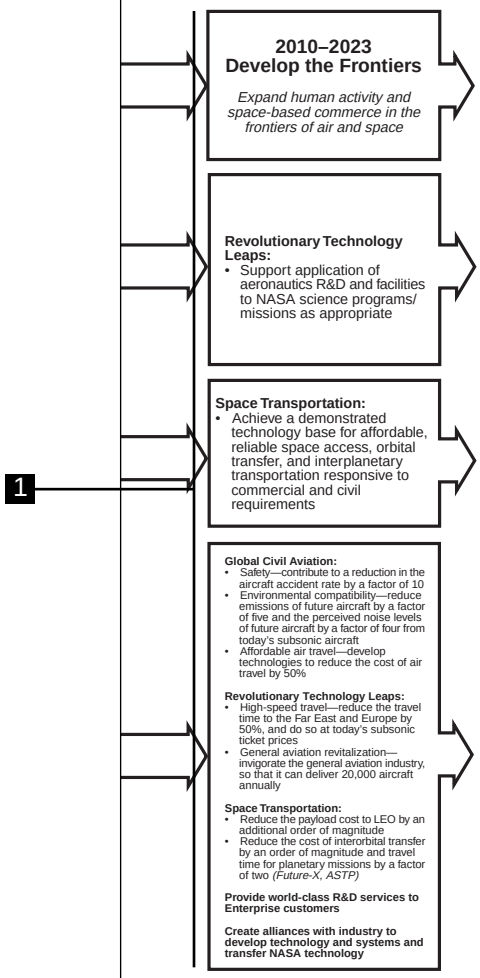
1. Changes reflect restatement of Access to Space goal, restructuring of service goals, changes to better reflect the scope of NASA impacts in some areas, reductions in Global Civil Aviation programs, and the phaseout of the High Speed Civil Transport program



1

fundamental and barrier issues. Base R&T elements will: (1) support the maturation of technology to a level that it can be confidently integrated into a Systems Technology program; (2) directly transfer technology to the external customer community as appropriate; and (3) provide the basis for new Systems Technology programs. The character of the Systems Technology programs will be to specifically target an integrated set of technologies that advance the goal/objective metrics and can be confidently developed and advanced to a level of maturity sufficient for transfer and adoption by the external customer community.

Roles and Responsibilities

The NASA Centers' primary missions to support the Aero-Space Technology Enterprise are listed in the table below.

Center	Mission
Ames Research Center	Aviation Operation Systems
Dryden Flight Research Center	Flight Research
Langley Research Center	Airframe Systems
Glenn Research Center	Aeropropulsion
Marshall Space Flight Center	Space Transportation Systems
Stennis Space Center	Rocket Propulsion Testing

AERO-SPACE TECHNOLOGY ENTERPRISE

1. Continuation of changes from page 98

36

environment sought by Earth Science may help us create environments that can sustain humans on other worlds.

Synergies also exist among our Crosscutting Processes. For example, the Manage Strategically process provides information to the other processes regarding the requirements and mandates of NASA's external customers and stakeholders. This information is used to determine what knowledge to generate, what aerospace products and services are needed to meet national goals in science and technology, and what knowledge must be communicated to whom. The Generate Knowledge process provides scientific results and discoveries to the Communicate Knowledge process, which disseminates this information widely in a format that is understandable by a broad audience.

External Partnerships and Cooperation

To encourage improved efficiencies for our human and capital resources, we are also developing synergies between the programs of the Enterprises and the capabilities of other partners in Government, industry, academia, and other nations.

The Earth Science Enterprise is NASA's contribution to the U.S. Global Change Research Program, in which our research and observational priorities are coordinated with 11 other Federal agencies. NASA contributes the space-based observing capability and the analysis of remote-sensing data essential for global and regional-scale studies. Partner agencies, such as the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS), perform the bulk of the surface-based observations and analyses, and mission agencies, such as the U.S. Department of Agriculture and the Environmental Protection Agency, focus the partners on regional uses of research results. NASA and NOAA are building an integrated program of research on the El Niño-Southern Oscillation phenomenon. NASA, NOAA, and the Department of Defense (DoD) have formed the Integrated Program Office for the development of the National Polar-orbiting Operational Environmental Satellite System (NPOESS)—the next-generation U.S. weather satellites in polar orbit. NASA, NOAA, and USGS are collaborating on the Landsat 7 program, and NASA, DoD, and USGS are planning a Shuttle-based synthetic aperture radar mission to meet all three agencies' requirements for a digital terrain model of Earth's surface. NASA and the Department of Agriculture are cooperating on land-cover and land-use change research. We are also collaborating with the Federal Emergency Management Agency to conduct natural hazards research and applications.

The Space Science Enterprise vigorously pursues opportunities to collaborate with other Government agencies about the origin, evolution, and destiny of the cosmos and life. Chief among these are the National Science Foundation, the Department of Energy (DOE), and DoD. Among other activities, the National Science Foundation and NASA collaborate with the Smithsonian Institution in the search, collection, distribution, and curation of Antarctic meteorites. DOE and NASA have partnered in the provision of radioisotope thermoelectric generators for the Galileo and Cassini spacecraft. Through its Los Alamos and Lawrence Livermore Laboratories, DOE has also contributed greatly to the development of instruments and sensors needed for several space science missions. DoD has been a major developer of high-sensitivity, large-area infrared detector arrays. In addition, recently declassified critical technology for large-area deployable optical systems will be of vital importance for future large telescopes in space. The Space Science

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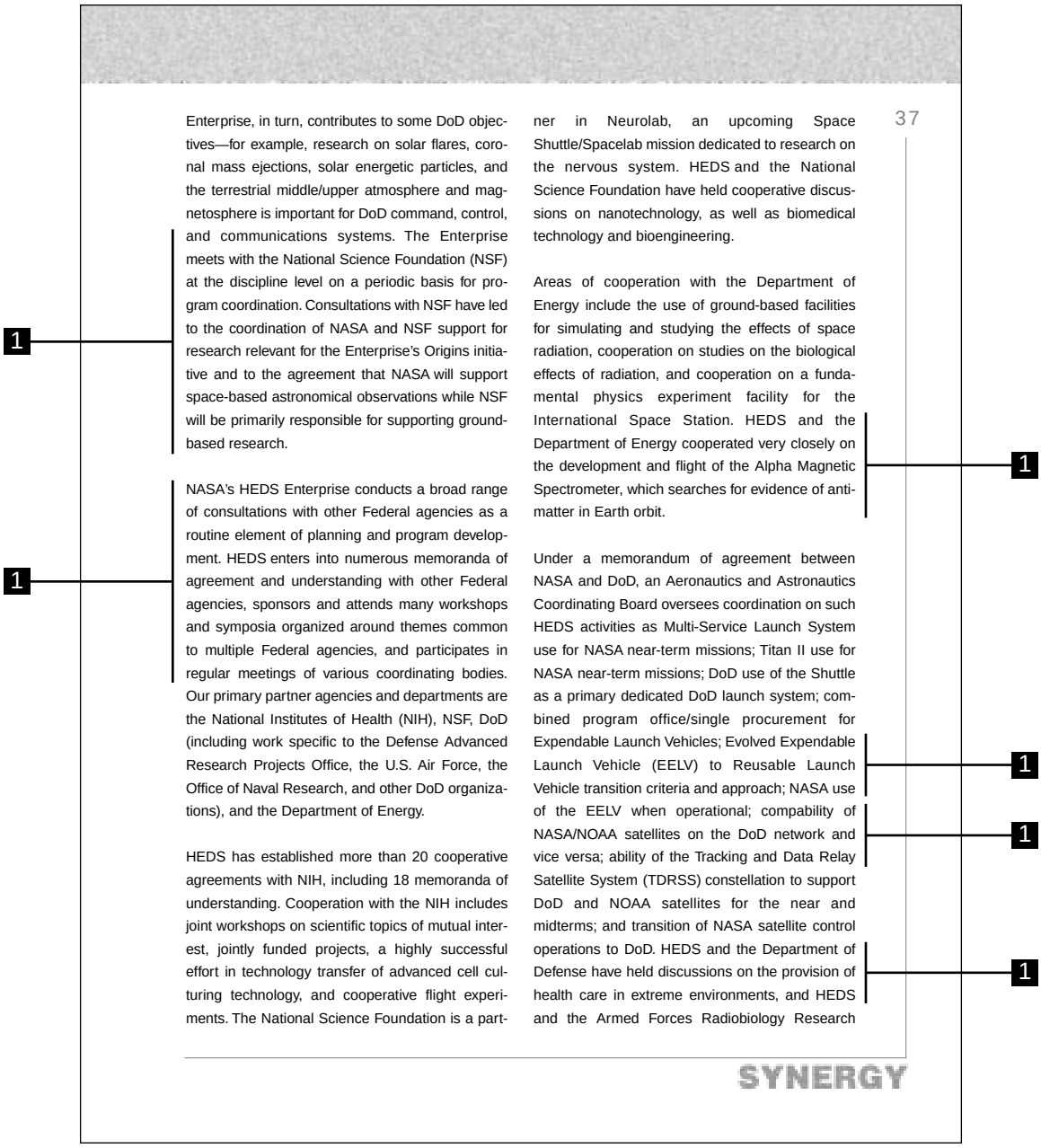
SYNERGY

1. Adds example of cooperation and partnerships



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Enterprise, in turn, contributes to some DoD objectives—for example, research on solar flares, coronal mass ejections, solar energetic particles, and the terrestrial middle/upper atmosphere and magnetosphere is important for DoD command, control, and communications systems. The Enterprise meets with the National Science Foundation (NSF) at the discipline level on a periodic basis for program coordination. Consultations with NSF have led to the coordination of NASA and NSF support for research relevant for the Enterprise's Origins initiative and to the agreement that NASA will support space-based astronomical observations while NSF will be primarily responsible for supporting ground-based research.

NASA's HEDS Enterprise conducts a broad range of consultations with other Federal agencies as a routine element of planning and program development. HEDS enters into numerous memoranda of agreement and understanding with other Federal agencies, sponsors and attends many workshops and symposia organized around themes common to multiple Federal agencies, and participates in regular meetings of various coordinating bodies. Our primary partner agencies and departments are the National Institutes of Health (NIH), NSF, DoD (including work specific to the Defense Advanced Research Projects Office, the U.S. Air Force, the Office of Naval Research, and other DoD organizations), and the Department of Energy.

HEDS has established more than 20 cooperative agreements with NIH, including 18 memoranda of understanding. Cooperation with the NIH includes joint workshops on scientific topics of mutual interest, jointly funded projects, a highly successful effort in technology transfer of advanced cell culturing technology, and cooperative flight experiments. The National Science Foundation is a partner in Neurolab, an upcoming Space Shuttle/Spacelab mission dedicated to research on the nervous system. HEDS and the National Science Foundation have held cooperative discussions on nanotechnology, as well as biomedical technology and bioengineering.

Areas of cooperation with the Department of Energy include the use of ground-based facilities for simulating and studying the effects of space radiation, cooperation on studies on the biological effects of radiation, and cooperation on a fundamental physics experiment facility for the International Space Station. HEDS and the Department of Energy cooperated very closely on the development and flight of the Alpha Magnetic Spectrometer, which searches for evidence of antimatter in Earth orbit.

Under a memorandum of agreement between NASA and DoD, an Aeronautics and Astronautics Coordinating Board oversees coordination on such HEDS activities as Multi-Service Launch System use for NASA near-term missions; Titan II use for NASA near-term missions; DoD use of the Shuttle as a primary dedicated DoD launch system; combined program office/single procurement for Expendable Launch Vehicles; Evolved Expendable Launch Vehicle (EELV) to Reusable Launch Vehicle transition criteria and approach; NASA use of the EELV when operational; compability of NASA/NOAA satellites on the DoD network and vice versa; ability of the Tracking and Data Relay Satellite System (TDRSS) constellation to support DoD and NOAA satellites for the near and midterms; and transition of NASA satellite control operations to DoD. HEDS and the Department of Defense have held discussions on the provision of health care in extreme environments, and HEDS and the Armed Forces Radiobiology Research

SYNERGY

1. Adds examples of cooperation and partnerships

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Institute cooperate on radiation biology studies of mutual interest.

AST works in alliance with its aeronautics and space transportation customers in industry, in the university community, and through several bilateral and trilateral relationships with DoD and the FAA. For example, the NASA-FAA Coordinating Committee provides for cooperative national programs in aviation safety, airspace operations, and environmental compatibility. The NASA-DoD Aeronautics and Astronautics Coordinating Board has fostered interagency planning for programs such as rotocraft and human factors research. The Board also is addressing cooperative activities for the National Aeronautics Testing Alliance. Another example of interagency planning is the Integrated Plan for Air Traffic Management Research and Technology Development produced by a NASA-FAA integrated product team.

Each interagency program includes regular consultations among the participating agencies to identify shared goals and objectives, collaborations, and interdependencies. As part of this process, we are working to identify common metrics and success criteria for each major milestone of the interagency programs.

NASA has also developed extensive alliances with its partners in other Government agencies to improve efficiencies for our human and capital resources, leverage unique capabilities, and reduce potential functional duplications. As a member of the National Science and Technology Council, which was established by the President in 1993, NASA participates in the planning of the diverse research and development initiatives of the Federal Government and the coordination of strategies for achieving shared goals and objectives. We have also worked closely with the Office of Science and Technology Policy, as well as agencies supporting space research and development to implement the President's National Space Policy and Goals for a National Partnership in Aeronautics Research and Technology. NASA obtains substantial procurement and contract administration services from DoD rather than duplicating these capabilities. We also cooperate with DoD and the General Services Administration in developing and maintaining the uniform Federal regulation governing acquisition. In addition, NASA relies on the Department of the Treasury for processing payments to contractors, and the Agency utilizes and supports the Justice Department in criminal investigations.

International cooperation is a key element of the strategies for all four Strategic Enterprises. NASA seeks cooperation of mutual benefit with its foreign partners. Through this cooperation, global issues are addressed on a global basis. International cooperation helps meet NASA's goals and objectives by adding unique capabilities or expertise, increasing mission flight opportunities, providing access to locations outside the United States, and enhancing the scientific return. It also allows nations to share the cost of implementing space and aeronautics programs. For example, the Space Science Enterprise has cooperatively established an International Mars Exploration Working Group to coordinate planning for robotic Mars exploration; discussions are under way to include European-provided communications components as critical elements of future missions in NASA's Mars Surveyor program. NASA has extensive cooperation with Canada, Europe, Japan, and Russia. NASA also has expanding cooperation with developing spacefaring nations. NASA is working with other nations to identify new opportunities for cooperation consistent with the goals of the Agency. 1

SYNERGY

1. Adds example of cooperation and partnerships

evaluate, and report the results. As each part of the organization completes its measurement process, data are used to validate that performance meets or exceeds planned goals, objectives, and performance targets. In those situations where performance does not meet the plan, opportunities for continuous improvement and reengineering are identified.

On a semiannual basis, NASA's Senior Management Council will review performance against the goals and objectives contained in this Plan, the Enterprise Strategic Plans, and the Annual Performance Plan. These reviews will take place in March and September of each year. To assess progress in meeting the Agency's general goals, we will review performance goals and measures that relate to the near-term objectives of our Enterprises and of our Crosscutting Processes. Examples of the relationships between Agency goals and performance goals include:

- Reducing development cycle time and cost and increasing launch rates for NASA spacecraft. This relates to the Agency goals to develop lower cost missions to characterize the Earth system and chart the evolution of the universe and solar system and to improve Shuttle safety and efficiency;
- Increasing the accessibility and use of science and research data. This addresses NASA's goals to characterize the Earth system and chart the evolution of the universe and solar system, to explore nature's processes in space, and to facilitate and stimulate the productive use of science and technology in the public and private sectors; and
- Increasing leverage of NASA's research and development investments in commercial partnerships with industry. This relates to our goals to develop new technologies and processes to enhance research and make aeronautics and space programs more affordable and to develop affordable technologies for U.S. leadership in aviation growth markets.

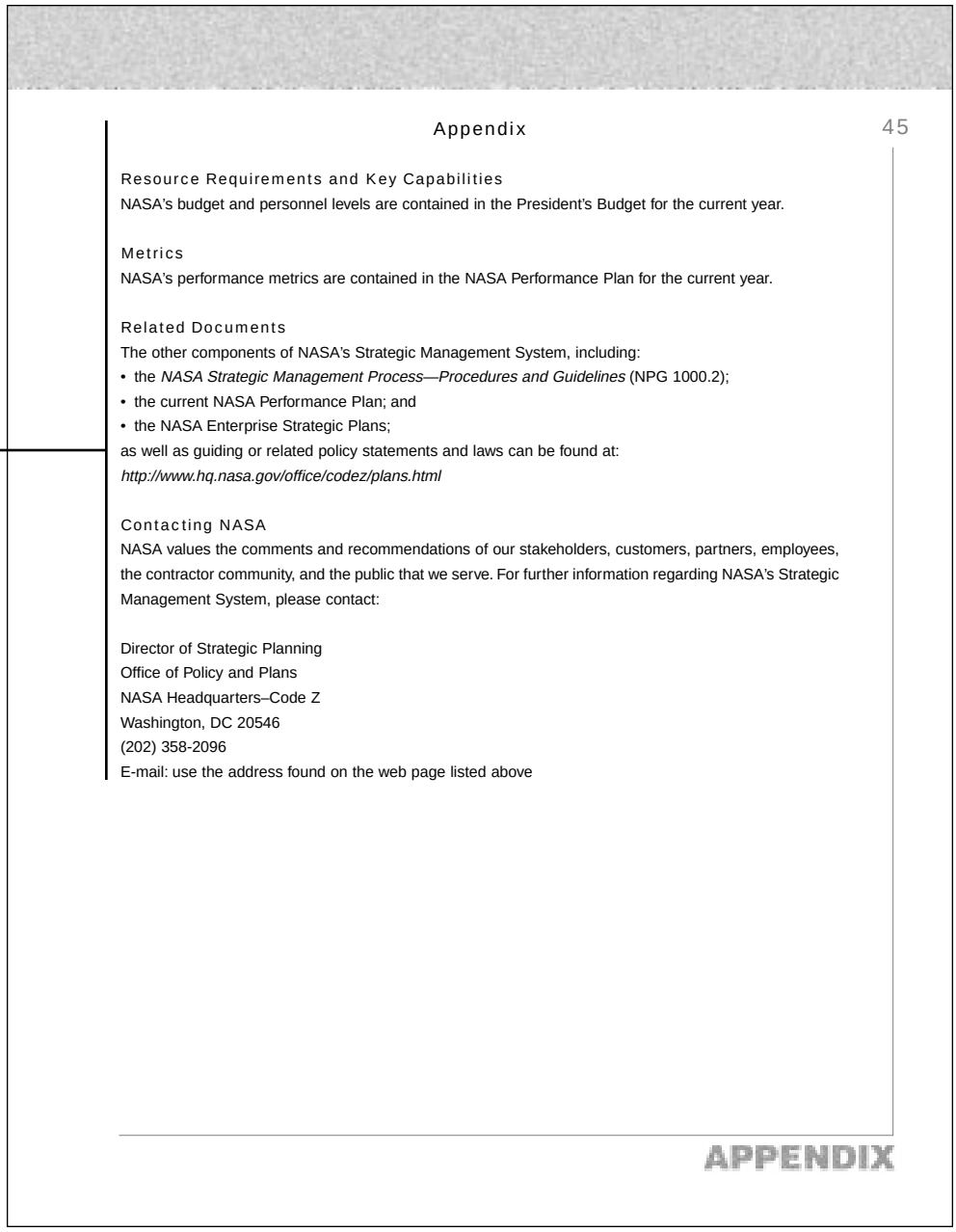
These measures will be included in the Agency's Annual Performance Plan and associated Performance Report. (Appendix 2 provides a summary of Enterprise and Crosscutting Process objectives and associated measures.)

At the program level, NASA's Program Management Council will continue to conduct reviews prior to initiation and throughout a program's life to confirm compliance with cost, schedule, and performance targets. In addition, NASA's Capital Investment Council will continually reaffirm that our investment decisions support overall program and institutional goals and that outcomes remain relevant and provide valuable contributions to the Nation's needs. To effectively manage our financial resources and evaluate Agency, Enterprise, and program-level performance, NASA is developing and implementing a new integrated financial management system. The integration of this system, and other initiatives such as full-cost accounting, will enable performance improvements to our financial and resource management.

NASA maintains a broad and diverse system of advisory committees under the Federal Advisory Committee Act, which includes the Aerospace Safety Advisory Panel and the NASA Advisory Council, its 7 standing committees, 20 standing subcommittees, and various task forces. The Agency extensively uses these advisory committees to obtain external input to its strategic and performance plans as well as to evaluate Agency performance. 1

CROSSCUTTING PROCESSES

1. Adds a description of the role of advisory committees in assessing performance



Appendix 45

Resource Requirements and Key Capabilities

NASA's budget and personnel levels are contained in the President's Budget for the current year.

Metrics

NASA's performance metrics are contained in the NASA Performance Plan for the current year.

Related Documents

The other components of NASA's Strategic Management System, including:

- the *NASA Strategic Management Process—Procedures and Guidelines* (NPG 1000.2);
- the current NASA Performance Plan; and
- the NASA Enterprise Strategic Plans;

as well as guiding or related policy statements and laws can be found at:

http://www.hq.nasa.gov/office/codez/plans.html

Contacting NASA

NASA values the comments and recommendations of our stakeholders, customers, partners, employees, the contractor community, and the public that we serve. For further information regarding NASA's Strategic Management System, please contact:

Director of Strategic Planning
Office of Policy and Plans
NASA Headquarters–Code Z
Washington, DC 20546
(202) 358-2096
E-mail: use the address found on the web page listed above

APPENDIX

1. Updated Appendix to eliminate duplication of other publications and to move references to the World Wide Web to prevent information from becoming outdated